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EXAMINER
TORRES, JOSE

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SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

PTOL-90A (Rev. 10/06)

	Application No.	**Applicant(s)**
Office Action Summary	10/699,658	PARK ET AL.
	Examiner	**Art Unit**	
	Jose M. Torres	2609	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,7-11,13-17 and 19-21* is/are rejected.

7)☒ Claim(s) *6,12 and 18* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All   b)☐ Some * c)☐ None of:

      1.☒ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date *See Continuation Sheet*.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :01/07/2005, 08/24/2005, and 12/21/2006.

DETAILED ACTION

Specification

1.   The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

- Claim 14 line 1: "computer-readable medium"

Appropriate correction is required.

Claim Objections

2.   Claims 8 and 14 are objected to because of the following informalities:

- Claim 8 line 6: "setting contrast" should be -- setting the contrast --

- Claim 14 line 8: "setting a contrast" should be -- setting the contrast --

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3.   The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4.   Claim 14 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply
with the written description requirement. The claim(s) contains subject matter which
was not described in the specification in such a way as to reasonably convey to one
skilled in the relevant art that the inventor(s), at the time the application was filed, had
possession of the claimed invention. The claim limitation "computer-readable medium"
in line 1 does not contain a proper description in the specification of the disclosure.
Therefore, applicant is advised to make the appropriate corrections required by an
amendment to include proper subject matter and in compliance with 35 U.S.C. 101 of
"computer-readable medium".

Claim Rejections - 35 USC § 102

5.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that
form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public
> use or on sale in this country, more than one year prior to the date of application for patent in the United
> States.

6.   Claims 1-3 are rejected under 35 U.S.C. 102(b) as being anticipated by Schu
(US 2002/0136464).

Re claim 1: Schu disclose a contrast compensation apparatus (Paragraph
[0002]), comprising: a pixel value detection unit (FIG.1, "mean value calculation
unit 1") to detect a distribution of pixel values of respective pixels of an input
image signal (Paragraph [0024]); a pixel value limit unit (FIG. 1, "first and second
transformation calculation units 2 and 3") having pre-set luminance limit values

and being coupled to the pixel value detection unit, re-configuring the distribution

of the pixel values of the respective pixels based on the pre-set luminance limit

values (Paragraphs [0024] and [0034]); and a mapping unit (FIG. 1, "mapper 4"),

coupled to the pixel value limit unit, to set a luminance of the respective pixels

based on a cumulative distribution function with respect to the re-configured pixel

values ("image processing unit", Paragraphs [0024] and [0034]).

Re claim 2: Schu disclose a first setting value to set an upper limit of the detected

pixel values of the respective pixels ("YHIGH"); and a second setting value to set

a lower limit of the detected pixel values of the respective pixels ("YLOW",

Paragraph [0034]).

Re claim 3: Schu disclose a first comparison part to compare the pixel values of

the respective pixels detected from the pixel value detection unit with the first

setting value, and to output the first setting value when the detected pixel values

exceed the first setting value (FIG. 2, "second transformation function calculation

unit"); and a second comparison part to compare the pixel values of the

respective pixels detected from the pixel value detection unit with the second

setting value, and to output the second setting value when the detected pixel

values of the respective pixels are smaller than the second setting value (FIG. 2,

"first transformation function calculation unit", Paragraphs [0024] and [0034]).

7.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8.   Claims 8, 9, 14, 15 and 19 are rejected under 35 U.S.C. 102(e) as being

anticipated by Goldstein (US 6,504,954).

Re claims 8 and 14: Goldstein disclose a contrast compensation method/

computer-readable medium, having stored thereon computer-executable

instructions of a contrast compensation method (Col. 4 lines 48-59), comprising:

calculating pixel values of an image signal (FIG. 1, "histogram **14**", Col. 3 lines

21-31); limiting the calculated pixel values based on pre-set luminance limit

values, and re- configuring the calculated pixel values of the image signal ("target

histogram counts t_i", Col. 4 line 60 through Col. 5 line 5); and calculating a

cumulative distribution function to reconfigure the calculated pixel values, and

setting contrast of the image signal based on the cumulative distribution function

(Col. 5 lines 8-51).

Re claims 9 and 15: Goldstein disclose setting an upper limit value of the

calculated pixel values ("$t_{N+1}(k)$"); setting a lower limit value of the calculated pixel

values ("$t_0(k)$"); and mapping the calculated pixel values greater than the upper

limit value and the calculated pixel values less than the lower limit value into the

upper limit value and the lower limit value, respectively ("target histogram counts

t_i", Col. 4 line 60 through Col. 5 line 5).

Re claim 19: Goldstein disclose a contrast compensation apparatus (col. 2 lines

37-40), comprising: a probability density function (PDF) calculation unit (FIG. 1,

"signal processor **11**") to detect a pixel value of respective pixels of an input

image, Col. 3 lines 21-31); a Bit Under threshold Bit Over threshold (BUBO) unit

(FIG. 1, "controller **12**"), coupled to the PDF calculation unit, to set one of a first

setting value and a second setting value based on the luminance degree of the

respective pixels and output resulting probability functions ("target histogram

counts t_i" (Col. 4 line 60 through Col. 5 line 5); a cumulative distribution function

(CDF) unit ("algorithm **40** within the controller **12**"), coupled to the BUBO unit, to

accumulate the probability functions outputted from the BUBO unit sequentially,

(Col. 5 lines 6-15); a CDF compensation unit ("second step algorithm **40**"),

coupled to the CDF unit, to reconfigure the accumulated probability functions

according to a predetermined luminance adjustment that reduces an influence on

a total luminance of an output image due to luminance of predetermined portions

forming the output image, (Col. 5 line 32-51); and a mapping unit, coupled to the

CDF compensation unit and to receive the input image, to store reconfigured

CDFs and map and output pixel values of the input image according to the

reconfigured CDFs ("target histogram", Col. 5 line 52 through Col. 6 line 25).

Claim Rejections - 35 USC § 103

9.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

10.   Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Schu in view of Kobayashi et al. (US 7,012,625). The teachings of Schu have been

discussed above.

However, Schu fails to disclose a first buffer having an input terminal from which

an image signal is inputted, and an output terminal connected to an output terminal of

the first comparison part; a first storage to store a first setting value; and a first

comparator to compare the image signal with the first setting value of the first storage,

and a second buffer having an input terminal to receive output from the first comparison

part, and an output terminal connected to an output terminal of the second comparison

part; a second storage to store a second setting value; and a second comparator to

compare the output from the first comparison part with the second setting value of the

second storage.

Kobayashi et al. teaches a first buffer (FIG. 7, "first counter 19_0") having an input

terminal from which an image signal is inputted, and an output terminal connected to an

output terminal of the first comparison part; a first storage (FIG. 7, "Comparison

Reference Value 11") to store a first setting value; and a first comparator (FIG. 7,

"Comparator 21_0") to compare the image signal with the first setting value of the first

storage, and, based on a result of the comparison, enable one of: the first buffer so that

the detected pixel value is outputted to the second comparison part; and the first

storage so that the first setting value is outputted to the second comparison part (Col. 6

line 39 through Col. 7 line 14) as recited in claim 4, and a second buffer (FIG. 7, "first

counter 19_1") having an input terminal to receive output from the first comparison part,

and an output terminal connected to an output terminal of the second comparison part;

a second storage (FIG. 7, "Comparison Reference Value 11") to store a second setting

value; and a second comparator (FIG. 7, "Comparator 21_1") to compare the output from

the first comparison part with the second setting value of the second storage, and,

based on a result of the comparison, to enable one of: the second buffer so that the

output value of the first comparison part is outputted from the pixel value limit unit; and

the second storage so that the second setting value is outputted from the pixel value

limit unit (Col. 6 line 39 through Col. 7 line 14) as recited in claim 5.

Therefore, in view of Kobayashi et al., it would have been obvious to one of

ordinary skill at the time the invention was made to modify Schu system by

incorporating the Counters, Comparison Reference Value to store YHIGH and YLOW,

and the comparators to perform a comparison step in which the reference or the actual

pixel value is outputted for further processing in order to provide an image quality

correcting system applicable for the correction of all kinds of images.

11.   Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schu in

view of Kuo et al. (US 5,982,926). The teachings of Schu have been discussed above.

Schu further teaches the pixel value is the brightness value (Paragraph [0023]).

However, Schu fails to disclose the pixel value is one among a grayscale value of

three primary colors R, G, B and a grayscale value of color difference signal Y, Cb, Cr.

Kuo et al. teaches the pixel value is one among a grayscale value of three

primary colors R, G, B (Col. 9 lines 55-67) and a grayscale value of color difference

signals Y, Cb, Cr (Col. 7 lines 30-43 and Col. 8 line 55 through Col. 9 line 7).

Therefore, in view of Kuo et al., it would have been obvious to one of ordinary

skill in the art at the time the invention was made to modify Shu's system by processing

the pixel values as grayscale values of three primary colors R, G, B and a grayscale

value of color difference signals Y, Cb, Cr in order to improve the appearance of images

as perceived by the human eye, and to render these images more suitable for computer

analysis.

12.   Claims 10 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Goldstein in view of Quardt et al. (US 5,434,931). The teachings of Goldstein have

been discussed above.

However, Goldstein fails to disclose converting the cumulative distribution

function into a predetermined gray level; and mapping the calculated pixel values of the

image signal based on the cumulative distribution function converted to the

predetermined gray level.

Quardt et al. teaches converting the cumulative distribution function into a

predetermined gray level; and mapping the calculated pixel values of the image signal

based on the cumulative distribution function converted to the predetermined gray level
(Col. 4 lines 5-21).

Therefore, in view of Quardt et al., it would have been obvious to one of ordinary
skill in the art at the time the invention was made to modify Goldstein method and
apparatus by incorporating the grey level transformation and mapping function based on
the cumulative distribution function converted to the predetermined grey level in order to
provide a superior image enhancement.

13.   Claims 11 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable
over Goldstein in view of Quardt et al. as applied to claims 10 and 16 above, and further
in view of McCaffrey (US 5,949,918). The teachings of Goldstein modified by Quardt et
al. have been discussed above.

However, Goldstein modified by Quardt et al. fails to disclose dividing the
cumulative distribution function by a number of pixels forming the image signal; and
multiplying by the predetermined gray level, the cumulative distribution function divided
by the number of pixels.

McCaffrey teaches dividing the cumulative distribution function by a number of
pixels forming the image signal; and multiplying by the predetermined gray level, the
cumulative distribution function divided by the number of pixels (Col. 4 lines 26-56).

Therefore, in view of McCaffrey, it would have been obvious to one of ordinary
skill in the art at the time the invention was made to modify Goldstein and Quardt et al.'s
method and system by incorporating the method steps and operations of dividing the

cumulative distribution function by a number of pixels forming the image signal; and

multiplying by the predetermined gray level, the cumulative distribution function divided

by the number of pixels in order to be readably implemented on a typical

microprocessor or digital signal processor (DSP) decreasing the processing time.

14.   Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over

Goldstein in view of Schu and Kuo et al. The teachings of Goldstein have been

discussed above.

        However, Goldstein fails to disclose the pixel value is one among the brightness

value, a grayscale value of three primary colors R, G, B and a grayscale value of color

difference signals Y, Cb, Cr.

        Schu teaches the pixel value is the brightness value (Paragraph [0023]).

        Kuo et al. teaches the pixel value is one among a grayscale value of three

primary colors R, G, B (Col. 9 lines 55-67) and a grayscale value of color difference

signals Y, Cb, Cr (Col. 7 lines 30-43 and Col. 8 line 55 through Col. 9 line 7).

        Therefore, in view of Schu and Kuo et al., it would have been obvious to one of

ordinary skill in the art at the time the invention was made to modify Goldstein method

by incorporating the pixel values being one among the the brightness value, a grayscale

value of three primary colors R, G, B and a grayscale value of color difference signals

Y, Cb, Cr in order to improve the appearance of images as perceived by the human

eye, and to render these images more suitable for computer analysis.

15.   Claims 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Goldstein in view of Schu. The teachings of Goldstein have been discussed above.

Goldstein further teaches a pixel value detector, arranged to receive the input

image, to detect a pixel value of the input image (FIG. 1, "signal processor **11**", Col. 3

lines 21-31); a subtractor (FIG. 3, "subtractor **23**"), coupled to the CDF unit and to the

barrel shifter, to calculate a difference between an output of the CDF unit and an output

of the barrel shifter; and an adder (FIG. 3, "adder **25**"), coupled to the subtractor and to

the pixel value detector, to add the pixel value and an output of the subtractor (Col. 4

lines 1-23) as recited in claim 21.

However, Goldstein fails to disclose a first comparison unit, coupled to the PDF

calculation unit, to compare a first setting value with the pixel value detected by the PDF

calculation unit; a second comparison unit, coupled to the first comparison unit, to

compare a second setting value with the pixel value from the first comparison unit, a

multiplier, coupled to the pixel value detector, to multiply the pixel value detected by a

number of pixels used to form a selected image from the input image to provide an

image signal; and a barrel shifter, coupled to the multiplier, to shift the image signal by a

predetermined pixel value used to form the selected image.

Schu teaches a first comparison unit, coupled to the PDF calculation unit, to

compare a first setting value with the pixel value detected by the PDF calculation unit,

wherein if the pixel value is greater than or equal to the first setting value, the first

comparison unit outputs the first setting value ("YHIGH"); and if the pixel value is less

than the first setting value, the first comparison unit outputs the pixel value; and a

second comparison unit, coupled to the first comparison unit, to compare a second setting value with the pixel value from the first comparison unit, wherein if the pixel value is less than or equal to the second setting value, the second comparison unit outputs the second setting value (YLOW); and if the pixel value is greater than the second setting value, the second comparison unit outputs the pixel value to the CDF unit (FIGS. 1 and 2, "units **2** and **3**", Paragraphs [0034] and [0037]) <u>as recited in claim 20</u>, and a multiplier, coupled to the pixel value detector, to multiply the pixel value detected by a number of pixels used to form a selected image from the input image to provide an image signal (FIG. 3, "factor **8**", Paragraph [0039]); a barrel shifter, coupled to the multiplier, to shift the image signal by a predetermined pixel value used to form the selected image (FIG. 3, "offset unit **10**", Paragraph [0042]) <u>as recited in claim 21</u>.

Therefore, in view of Schu, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Goldstein apparatus by incorporating the transformation units to limit the brightness value to a maximum and minimum value by comparing the pixel's actual value with a predefined limit YHIGH or YLOW and outputting this value when it is exceeded or less than respectively, and incorporating the subsampling device and offset units in addition to the signal processor in order to enable the contrast of the image to be enhanced as a function of the contrast already present in the image.

Allowable Subject Matter

16.   Claims 6 and 12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

17.   Claim 18 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 1st paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Conclusion

18.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Choi disclose a Contras Enhancing Apparatus for Video Signal, Tao disclose a Smart Progressive-Scan Charge-Coupled Device Camera, Matsishima disclose an Image Processing Apparatus, Method, Computer Program and Storage Medium, Eschbach disclose an Image-Dependant Exposure Enhancement, Kim et al. disclose an Image Quality Enhancing Method Using Mean-Matching Histogram Equalization and a Circuit Thereof, and Higgins-Luthman et al. disclose a Document Image Compression System and Method.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jose M. Torres whose telephone number is 571-270-1356. The examiner can normally be reached on Monday thru Friday: 8:00am - 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jong-Suk (James) Lee can be reached on 571-272-7044. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JMT
01/24/2007

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SUPERVISORY PATENT EXAMINER